The level of information technology adoption and its factors in micro, small, and medium enterprises in Jambi City, Indonesia

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Abstract
This study aims to analyze the conditions and the level of information technology (IT) adoption in micro, small, and medium enterprises (MSMEs) in Jambi City and its factors. The data was obtained by carrying out a sample survey on MSMEs in Jambi City. The study uses descriptive analysis and Structural Equation Modeling-Partial Least Square (SEM-PLS). The results of the study found that: 1) the level of IT adoption in MSMEs in Jambi City is still relatively low. About one third of MSMEs is still using IT only for internally oriented functional integration. On the contrary, only 1.89 percent of MSMEs have been in the stage of business scope redefinition under influence of IT; 2) Behavior intention has a significant effect on the level of IT adoption in MSMEs. Furthermore, there are five variables that influence behavioral intention of MSMEs related to the use of IT. Those are effort expectance, social influence, hedonic motivation, price value, and habit.

Keywords: *MSMEs, Information Technology, Adoption*

JEL Classification: O14, O33, L25

INTRODUCTION

Micro, Small and Medium Enterprises (MSMEs) are known to have an important role both in developed and developing countries, in employment, economic growth and industrial growth of a country (Mahemba, 2003; Tambunan, 2005; Rahmana, 2009). Empirical studies showed that MSMEs on an international scale are a source of job creation (Olomi, 1999; Lin, 1998; Westhead and Cowling, 1995). Almost 90% of the total businesses in the world are contributions from MSMEs (Lin, 1998).

In Indonesia, in terms of quantity, 99.97% of the total business in Indonesia turned out to be people's economy sector (MSME), and became very strategic because it was able to absorb 99.5% of the workforce (Ririh, Anggarhini, Amalia. 2011). MSMEs in Indonesia also have an important role in maintaining economic stability. When the 1998 economic crisis occurred, only MSMEs survived from the collapse of the economy, while the larger businesses fell by the crisis.

Basri (2003) argued that SMEs in Indonesia can survive in times of economic crisis caused by 4 (four) things, namely: (1) Some SMEs produce consumer goods, especially those that do not last long, (2) Majority of SMEs rely more on non-banking financing for its business funding, (3) SMEs generally carry out strict product specialization, in the sense that they only produce certain goods or services, and (4) the formation of new SMEs as a result of the termination of employment in formal sector.

However, to compete in multilateral free trade (WTO), regional (AFTA), informal cooperation (APEC), and ASEAN Economic Community (AEC), SMEs are required to make changes in order to improve their competitiveness, so that they can continue to run and develop. One of the changes is starting to use information technology (IT). A case studie in Europe showed that more than 50% of productivity was achieved through investments in IT.

Same as in other regions in Indonesia, MSME of Jambi City has also shown its important role in people's economy. The 2016 data showed that there were 10,588 MSMEs in Jambi City. Based on the data, there were 8,469 micro enterprises, 1,765 small enterprises, and 354 medium enterprises that were employing 16,394 people, 8,950 people, and 5,310 people respectively.

Considering the important role of MSMEs, it is necessary to conduct further studies on MSMEs in Jambi City, particularly those related to the adoption of IT in order to improve competitiveness in the face of competition on the global market.

LITERATURE REVIEW

Information technology

Information Technology (IT) is a technology used to create, store, exchange and use information in a variety of ways. Computers and communication tools are part and a combination of IT (Sawyer, 2007; McKeown, 2009). According to Martin (1999) and Lukas (2000), IT is not only limited to computer technology used to store information, but also includes communication technology to transmit information in electronic form.

The advancement of technology has been exceptionally fast. Many new discoveries in technology show the rapid advancement of technology, from simple to cutting-edge technology. The use of IT improves the quality of life, and supports daily activities and applies both to business and government (Cortada, 2009).

McLeod (2005) stated that there are three fundamental roles of IT in business: (1) support of its business processes, (2) support of decision making by its employees and managers, and (3) support of its strategies for competitive advantage. Yuliana (2000) explained that IT can provide business strategy advantages to win competitions in terms of global dissemination, interaction, customization, collaboration, electronic commerce (EC) and integration.

Adoption of information technology

Adoption is the initial acceptance of an object. Adoption of technology is one step that must be done before implementing technology in a business field (Perdana, 2011). Adoption of technology is one of the important factors in improving product quality, because technology becomes one of the drivers of environmental change (business world), so that it can compete in increasingly competitive conditions (Lee et.al, 2012). In some developed countries, the adoption of new technologies in an industrial system can contribute 40-50% to their economic growth. Even in Japan it can contribute 66% to its economic growth (Nazarudin, 2008).

Nagi (2010) and (Kim & Crowston, 2011) stated that adoption is a series of stages, awareness, individual intentions that arrive at the act of accepting an object and implementing or using. Furthermore, related to MSME, Knol and Stroeken (2001) proposed a scenario that could be used to measure the phase of IT adoption. IT adoption of SMEs is divided into six levels as summarized in Table 1.

Related to the factors that influence technology adoption, there are various behavioral theories which are widely used by researchers, including the Theory of

Reason Action (TRA) (Kings and Gribbins (2002), Theory of Planned Behavior (TPB) (Chau and Hu 2001), Task-Technology Fit Theory (TFT) (Dishaw, Strong, and Bandy, 2002), Technology Acceptance Model (TAM) (Davis, 1989) and Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al (2003)

Table 1. The phase division of the IT scenario model

Phase	Description
0	No usage of information technology
1	Internally oriented functional integration. Phase one is aimed at the computerisation of existing activities to improve efficiency. As a result, the emphasis is placed on internally oriented integration of existing activities. Often programs are used to register, wholly or partly, the information flows from the primary process. in SMEs, generally standard integrated programs are used.
2	Internally oriented multifunctional integration. In phase two the improvement in effectiveness is realised through internally oriented multifunctional integration. This lends more depth and breadth to the integration mentioned in phase one. The programming from phase one is applied in a more advanced and refined way.
3	Externally oriented process integration. Phase three is aimed at the improvement of the present product-market combination through a type of process integration, in which a greater emphasis is placed on the externally oriented improvement of business processes. This means that the strategic position of the enterprise in the market and supply chain is the focal point of attention. Information technology is implemented in such a way that it makes a fundamental contribution to the customer approach and supply chain integration
4	Business process redesign. Phase four encompasses the redesign of business processes to extend the external orientation. As a result, the enterprise has the ability to orient itself towards innovative product-market combinations. Information technology functions more as *enabling technology* in this phase.
5	Business scope redefinition under influence of information technology. Phase five is related to the revision of business goals under the influence of information technology so that the enterprise undergoes a complete external re-orientation.

Source: Knol and Stroeken (2001)

This study used the UTAUT model, especially UTAUT Version 2, UTAUT model, which was proposed by Venkatesh et al (2003). This model consists of 4 determinants of IT objectives and uses. Those are performance expectancy, effort expectancy, social influence, and facilitating conditions. Also 4 variables as moderators between determinants and IT objectives and uses are gender, age, experience, and voluntariness.

Performance expectancy is defined as the degree to which the user expect that using the system will help him or her to attain gains in job performance. Effort expectancy can be explained as the degree of ease associated with the use of the information system. Social influence is defined as the degree to which an individual perceives that important others believe that will influences him using the new system and is a determining factor for behavioral intention in using IT and facilitating conditions is reffering to the resources and the availability of support for user behavior**.** Furthermore, performance expectancy, effort expectancy, social influence, and facilitating conditions are relating to behavioral intention as the main behavior in technology acceptance which ultimately results in use behavior as the behavior to be achieved in the use of technology.

UTAUT was extended from organizational context to individual consumer context in 2012 by adding three new constructions namely habit, hedonic motivation

and, price value. Habit can be defined as the degree to which people believe the behavior to be automatic as a result of learning, hedonic motivation can be described as a benefit derived from using technology and regarded as an important role in determining technology acceptance, and price value can be described as the user's view between which technology is truly needed and which is not. UTAUT 2 also has three moderating variables namely age, sex and experience (as in Figure 1)

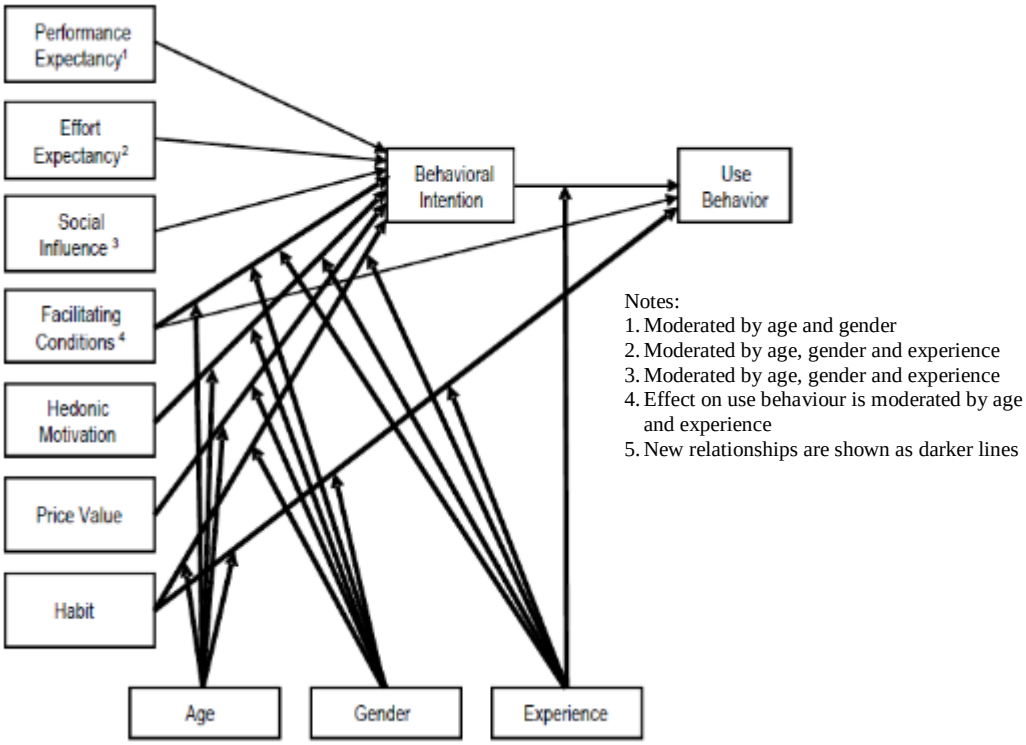

Figure 1. UTAUT version 2 (Venkatesh et al., 2012)

Research position

There are two points that distinguish this study to the previous studies. First, *use behavior* (IT use behavior) as a variable in previous studies was generally using frequency as its indicator of technology use. However, in this study, five stages of technology adoption as stated by Kim & Crowston (2011) and Nagi (2010) will be used. Next, the moderating variable used is not only the individual characteristics of the user (manager/owner of the MSME), but also the characteristics of MSME, namely capital and business turnover. Individual characteristics modeled into moderating variables on behavioral intentention while characteristics of business modeled into a moderating variable on the phase of technology adoption.

RESEARCH METHODS

The data for this study is primary data sourced from MSME actors in Jambi City. Research population for the study is all MSMEs in Jambi City (10,588 enterprises). The sample is set at 2.5 percent of the total population, which is 265 units of MSMEs. The study used proportional random sampling based on the scale of the firms/enterprises.

Primary data was collected by using questionnaire directed to SMEs. Also interview guides were used for "in-depth interview" to selected SMEs in order to obtain a variety of qualitative information to supplement quantitative information obtained from questionnaire.

Table 1. Sample proportion of MSME

Scale of Business	Population (units)	Sample (units)
Micro	8469	212
Small	1765	44
Medium	354	9
Total	10588	265

Preliminary data analysis is done descriptively using descriptive statistical tools and single frequency tables and cross tabulations. After that, to analyze the factors influencing the level / phase of technology adoption, a Structural Equation Modeling – Partial Least Square (SEM-PLS) is used as Figure 2.

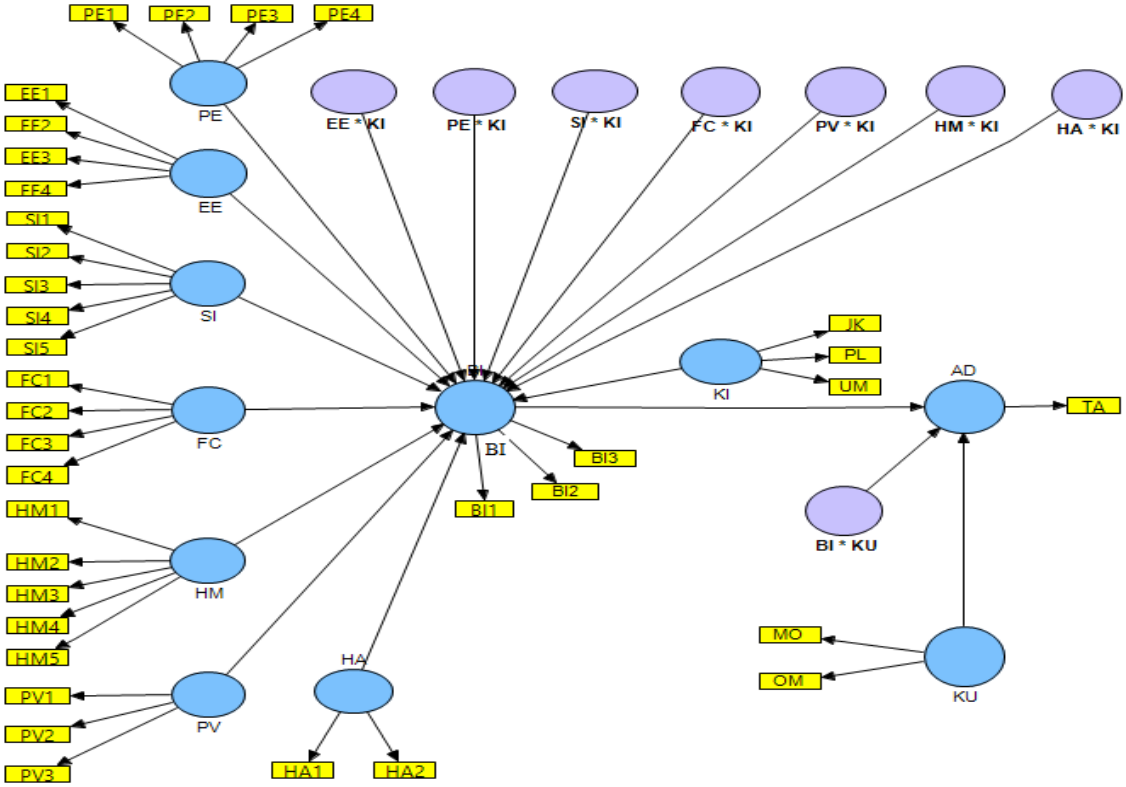

Figure 2. Research Model

The definition and measurement of variables in the research model are given in the Table 2.

Table 2. Definition and measurement of variables

Variable	**Definition and Measurement**
Performance Expectancy = PE	Degree to which the user expect that using the system will help him or her to attain gains in job performance. Using four indicators measured in Likert scale: PE1 = IT usability in work PE2= IT capability in completing work faster PE3 = IT capability in increasing productivity PE4= IT capability in obtaining better results
Effort Expectancy = EE	Degree of ease associated with the use of IT. Using four indicators measured in Likert scale: EE1 = ease of understanding IT procedures EE2= ease of being skilled using IT EE3= ease of using IT EE4= ease of learning to operate IT

Variable	Definition and Measurement	
Social influence = SI	Degree to which an individual perceives that people influence him/her using IT. Using five indicators measured in Likert scale SI1 = support from government SI2 = motivation from other MSMEs SI3= advice from influential people SI4 = advice from important people SI5 = support/assistance from influential people	
Facilitating conditions = FC	Degree to which an individual believes that the availability of technical and organizational infrastructure support the use of the system. Using four indicators measured in Likert scale: FC1 = have physical IT resources, FC2 = have the knowledge to use IT, FC3 = system compatibility, FC4 = have expert to help with the difficulties	
Habit = HA	The tendency to perform automatic behavior due to learning. Using two indicators measured in Likert scale: HA1 = accustomed to working with IT, HA2 = must use IT to finish the job,	
Hedonic Motivation = HM	Degree of pleasure and comfort using IT. Using five indicators measured in Likert scale: HM1 = right and good idea to use IT, HM2 = IT makes work more attractive, HM3 = using IT is fun HM4 = IT makes work more entertaining HM5 = likes to learn to use IT	
Price Value = PV	The perceived benefit of the financial costs for IT. Using three indicators measured in Likert scale: PV1 = there is a free version of IT, PV2 = the price of IT product is reasonable, PV3 = the IT product has a pretty good price	
Behavioral Intention = BI	The degree to which someone will use IT in the future. Using three indicators measured in Likert scale: BI1 = will use IT in the future, BI2 = will use IT for work, BI3 = plan to use IT more often	
Phase of technology adoption = AD	Measured by an ordinal scale referring to Knol and Stroeken (2001)	
Characteristics of MSMEs' actors		
Age = UM	Divided into five groups 1 =< 19 years old 2 = 20 – 29 years old 3 = 30 – 39 years old	 4 = 40 – 49 years old 5 = 50 +
Sex/Gender = JK	1 = male	0 = female
Experience= PL	Business experience (years) 1= < 2 2= 2 - 4	 3= 4 - 6 4= > 6
Business characteristics of MSMEs		
Capital = MO	Capital in rupiah	
Turnover = OM	Turnover in rupiah per month	

RESULTS AND DISCUSSION

Ownership and utilization of information technology

The ownership of IT equipment in MSMES in Jambi City is relatively good. Of the 265 business units, there were only 37 business units (13.96 percent) which did not have at least one IT device/equipment. Most others have had at least one of these devices intended for business management (Table 3).

There are two types of IT devices commonly owned by MSMEs in Jambi City, that are mobile phones/smartphones and PC/laptop. It can be seen from the fact that 73.21 percent of the business units have mobile phone/smartphone and 54.34 percent of the business units have PC/laptop for managing their business

Table 3. Distribution of MSMEs based on the ownership of information technology equipments/devices in Jambi City in 2018

Type of Device	Have		Don't Have		Total	
	Freq.	%	Freq.	%	Freq.	%
Computer PC/Laptop	144	54.34	121	45.66	265	100.00
Printer	74	27.92	191	72.08	265	100.00
Mobile phone/Smartphone	194	73.21	71	26.79	265	100.00
Telephone	42	15.85	223	84.15	265	100.00
Facsimile (Fax Machine)	9	3.40	256	96.60	265	100.00

Source : Field survey, 2018

Use of computers/laptops for business

There are various types of IT devices that can be used in managing a business. Even so, this section will specifically analyze the use of computers/laptops as the main device and the most commonly used in IT.

The use of computers/laptops for businesses in MSMEs in Jambi City showed a relatively diverse condition. The two main types of use are to access the internet (78.47 percent) and information systems (61.81 percent) (Table 4)

Table 4. Distribution of the use of computers for businesses in MSMEs in Jambi City in 2018

Use of Device	Use		Don't use		Total	
	Freq.	%	Freq.	%	Freq.	%
Making financial statements	85	59.03	59	40.97	144	100.00
Making a work report	76	52.78	68	47.22	144	100.00
Correspondence	58	40.28	86	59.72	144	100.00
Designing products	79	54.86	65	45.14	144	100.00
Accessing the internet	113	78.47	31	21.53	144	100.00
Information system	89	61.81	55	38.19	144	100.00
Presentation	13	9.03	131	90.97	144	100.00
Others	10	6.94	134	93.06	144	100.00

Source: Field research, 2018

Utilization of the internet for business management and development

It can be stated that internet utilization by MSMEs in Jambi City has been relatively good. Nearly two thirds (171 business units of 64.53 percent) of MSMEs have used internet for their business activities (Table 5).

Table 5. Distribution of internet usage by MSMEs in Jambi City in 2018

Internet Usage	Use Internet		Don't Use Internet		Total	
	Freq.	%	Freq.	%	Freq.	%
Browsing to see the features of other similar products	92	53.80	79	46.20	171	100.00
Browsing to find ways to improve product quality	105	61.40	66	38.60	171	100.00
Browsing to find out what their competitors are doing	66	38.60	105	61.40	171	100.00
E-mail/chat to communicate with consumers	120	70.18	51	29.82	171	100.00
E-mail/chat to communicate with suppliers	67	39.18	104	60.82	171	100.00
E-mail/chat to communicate with product distributors/marketers	61	35.67	110	64.33	171	100.00
Mailing list for product promotion	24	14.04	147	85.96	171	100.00
Providing online orders/transactions	54	31.58	117	68.42	171	100.00
Website for promotion	35	20.47	136	79.53	171	100.00
Blog for promotion	19	11.11	152	88.89	171	100.00
Social media for promotion	131	76.61	40	23.39	171	100.00
Others	6	3.51	165	96.49	171	100.00

Source : Field survey, 2018

Furthermore, the purposes of internet usage by MSMEs in Jambi City are also relatively diverse. The largest proportion (76.61 percent) of the purpose of internet usage by MSMEs in Jambi City is to promote their products through social media. Also the types of intenet usage which are also relatively dominant (done by more than half of the MSMEs) are e-mail/chat to communicate with consumers, browsing to find ways to improve product quality, browsing to see the benefits / features of other similar products.

Adoption of information technology by MSMEs in Jambi City

Based on the analysis of the ownership, level of utilization and usage of IT in business development and its future plans, the phase of IT adoption in MSMEs in the Jambi City are given in the Table 6.

Table 6. The phase of IT adoption in MSMEs in Jambi City

Phase	Decription	Frequency	Percentage
0	No usage of Information Technology	94	35.47
1	Internally oriented functional integration	90	33.96
2	Internally oriented multifunctional integration	40	15.09
3	Externally oriented process integration	19	7.17
4	Business process redesign	17	6.42
5	Business scope redefinition under influence of information technology	5	1.89
	Total	265	100.00

Table 6 shows that IT adoption in MSMEs in Jambi City is still relatively low. More than a third (35.47 percent) have not used IT at all. About one third is still at the 1st stage of IT adoption which is internally oriented functional integration. At this stage, the use of IT is only for business administration interests in a simple manner such as making work reports and communicating with consumers.

On the contrary, only 1.89 percent of MSMEs in Jambi City have been at the 5th stage level of IT adoption. At this stage, the use of ICT is quite wide in scope, for example, to communicate with consumers, establish cooperation with business partners, use their own applications or softwares to run their business, and plan to open a branch in another place.

Factors influencing the level of IT adoption in MSMEs in Jambi City

Initial model testing and modification of the model

Before carrying out further analysis, an evaluation of the initial model proposed is mainly carried out primarily related to the validity and reliability of the indicators on the latent variable (construct). Validity test uses the convergent test and discriminates the validity of the indicator. Reliability test uses two criteria, namely composite reliability and cronbachs alpha.

Convergent validity test was carried out based on the correlation between the item score and the construct score. Reflectif indicators is said to be high if it correlates more than 0.70 with the construct measured. Discriminant validity test was done by comparing the value of the square root of average variance extracted (AVE) of each construct with the correlation between constructs in the model. If the square root value of AVE for each construct is greater than the value of the correlation between constructs in the model, then it can be concluded to have good discriminant validity value.

The construct reliability test is measured by two criteria, namely composite reliability and cronbachs alpha. It was done to assess whether an indicator is truly reliable in measuring the construct. The construct is stated to be reliable if the value of composite reliability and cronbachs alpha are above 7.0.

Based on the initial model testing, it was found that all indicators were valid and reliable in measuring constructs except individual characteristic variables (KI) and facilitating condition (FC). Gender (JK) and experience (PL) as indicators of KI and FC4 (have expert to help with the difficulties) as indicators of FC are not valid and reliable, so they are excluded from the model (Figure 3).

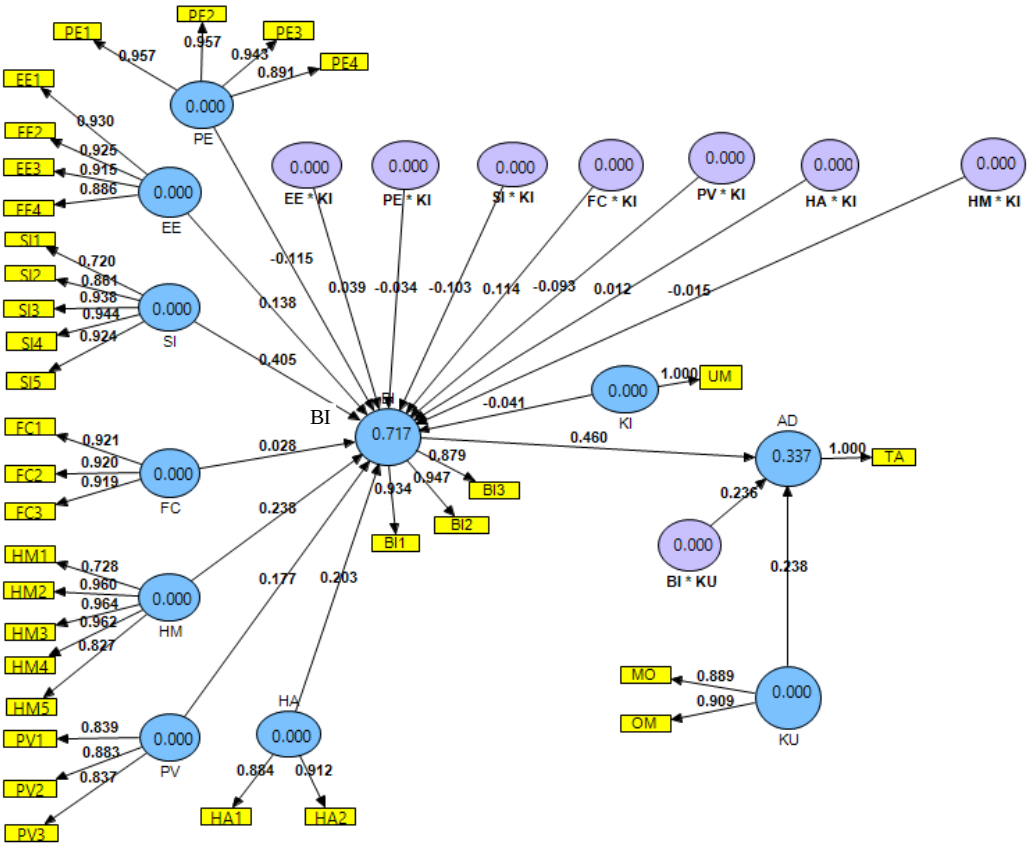

Figure 3. Modification of the model

Convergent and discriminant validity tests

Based on Figure 3, it shows that the correlation (loading) of all indicators with constructs is above 0.7, so that all indicators are valid. The same thing can also be seen in the discriminant validity test (Table 7). The square root value of AVE for each construct shows greater than the correlation value between constructs in the model.

Table 7. Correlations between constructs and square root value of AVE

	Correlation											square root of AVE
	BI	**EE**	**FC**	**HA**	**HM**	**KI**	**KU**	**PE**	**PV**	**SI**	**AD**	
BI	1.00											0.92
EE	0.58	1.00										0.91
FC	0.60	0.68	1.00									0.84
HA	0.64	0.66	0.68	1.00								0.90
HM	0.67	0.59	0.63	0.65	1.00							0.89
KI	-0.20	-0.22	-0.15	-0.21	-0.12	1.00						1.00
KU	-0.04	-0.07	0.05	0.00	0.08	0.19	1.00					0.90
PE	0.61	0.70	0.71	0.66	0.71	-0.14	0.06	1.00				0.94
PV	0.63	0.55	0.60	0.59	0.66	-0.15	0.13	0.70	1.00			0.85
SI	0.60	0.25	0.39	0.29	0.33	-0.08	0.12	0.39	0.35	1.00		0.88
AD	0.44	0.46	0.49	0.51	0.42	-0.16	0.29	0.54	0.49	0.40	1.00	1.00

Reliability test

The value of crobanch alpha and composite reliability is given in the Table 8. Table 8 shows that all variables have composite reliability and crobanch alpha values above 7.0. In conclusion, the model has good reliability.

Table 8. Crobanchs alpha and composite reliability

	Cronbachs Alpha	Composite Reliability
BI	0.909436	0.943357
EE	0.934485	0.953239
FC	0.909539	0.943026
HA	0.760323	0.892582
HM	0.93343	0.951346
KU	0.763475	0.894026
PE	0.953636	0.966568
PV	0.820374	0.889080
SI	0.927004	0.945334

Goodness-of-fit model evaluation

Goodness-of-fit evaluation was done by looking at the R-squared value. Structural models that have R-squared value of 0.67 indicate that the model is "good", r-squared value of 0.33 indicates that the model is "moderate", and r-squared value of 0.19 indicates that the model is "weak".

Based on the results of the analysis found that the R-squared value for "BI model" is 0.7165 and the R-squared value for "AD model" is 0.3370. This means that the goodness of fit of the "BI model" is good and the "AD model" is moderate

Interpretation of relationships between variables

The relationship between variables can be seen from the parameter coefficient value and significance of t statistics. A relationship is said to be significant if t statistic is greater than t table (significance 10% = 1.64).

Based on figure 4, it shows that of the seven variables that influence behavioral intention (BI), five variables show a significant influence, that are, effort expectance (EE), social influence (SI), hedonic motivation (HM), price value (PV), and habit (HA), while the other two variables, performance expectance (PE) and facilitating condition (FC), do not show a significant influence. The insignificance of performance expectance (PE) in this study is not in line with some of the results of previous studies, including Oswari, Suhendra, Harmoni (2008) Gefen and Straub (2000), Suhendra, Hermana and Sugiharto (2009). Likewise, the insignificance of facilitating conditions in this study is different from the results of Anderson and Schwager's research (2004), Suhendra, Hermana, Sugiharto (2009)

BI has a significant influence on the level of IT adoption in MSMEs (AD). The moderating variable that moderates BI (i.e individual characteristics (KI) with a single indicator which is age) does not have a significant influence.

The results of this study are not in line with the research of Koning (2006), Chuang (2009) and Tsourela and Roumeliotis (2015) who found that both the age of top management teams and workers in the small businesses were significant predictors of the extent of IT adoption. In addition, all the interaction variables (PE*KI), (EE*KI), (SI*KI), (FC*KI), (HM*KI), (PV*KI) and (HA*KI) also do not show significant effect/influence to BI. Based on this, it can be stated that age (as a single indicator of KI), does not moderate the influence of PE, EE, SI, FC, HM, PV and HA on BI, but has the potential to become a moderating variable (homologiser moderation)

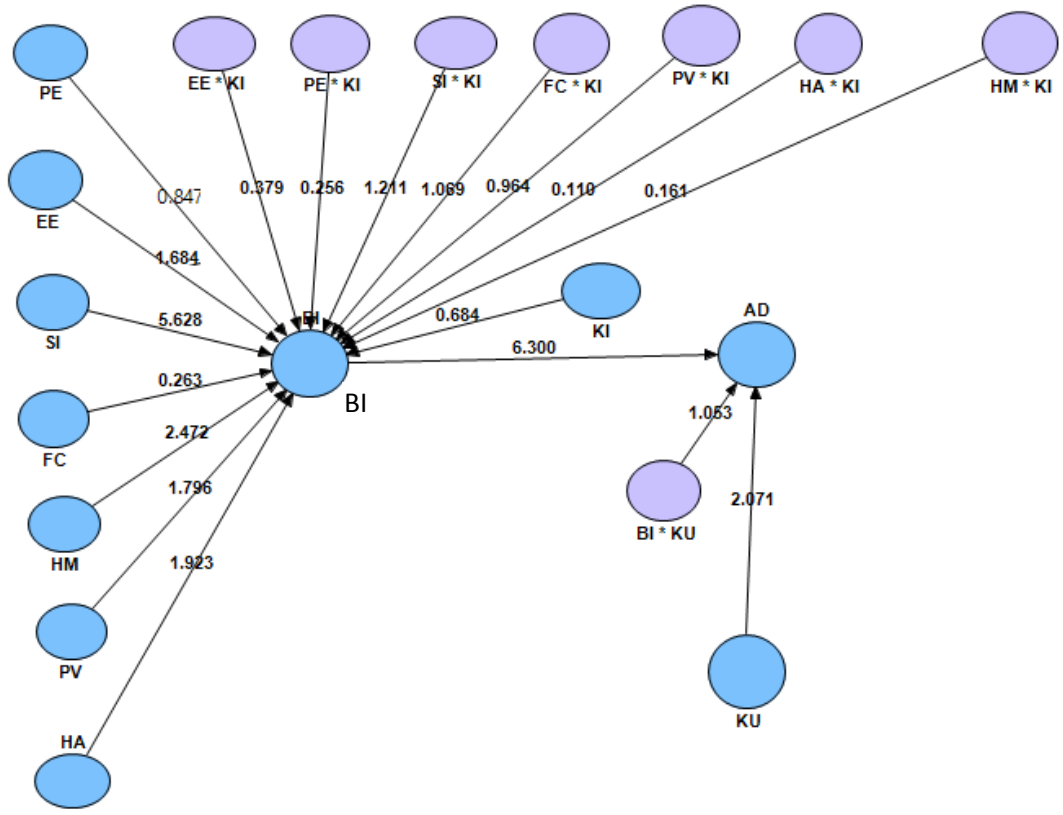

Figure 4. t-statistics of the model

Furthermore, the variable that moderates AD (ie business characteristic variables (KU) with two indicators, business capital (MO) and turnover (OM)) has a significant effect. Business capital and business turnover basically refers to the scale of business. Thus, the results of this study are in line with the results of research Dutta and Coury (2003,) and Irefin, Abdul-Azeez, and Tijani, (2012). The research has shown a negative relationship between business size and ICT adoption. Large businesses that possess adequate financial resources, maturity, knowledgeable employees and operation performance are likely to adopt ICT not Small enterprises that are still under nurturing. In order to get scale of economy, the more business size, the more intention business could adopt ICT.

However, its interaction variable (BI*KU) does not have a significant effect. In other words, KU as the variable is categorized as moderating predictor, moderating variable that only acts as predictor in the formed relationship model.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

IT adoption of MSMEs in Jambi City is still relatively low. More than a third of MSMEs have not used IT at all. About one third of them are still in 1st stage of IT adoption (internally oriented functional integration). On the contrary, only 1.89 percent of them have been at 5th stage of IT adoption (Business scope redefinition under influence of information technology).

Referring to the UTAUT2, there are five variables that influence behavioral intention of MSME actors related to the use of IT. Those are Effort Expectance (EE), Social Influence (SI), Hedonic Motivation (HM), Price Value (PV), and Habit (HA).

Behavioral intention also has a significant influence on the level of IT adoption in MSMEs (TA).

In terms of its moderating variable, individual characteristic (Age) doesn't moderate the influence of PE, EE, SI, FC, HM, PV, and HA on BI, but has the potential to be a moderating variable)

In the context of its moderating variable, individual characteristics (age) do not moderate the influence of PE, EE, SI, FC, HM, PV and HA on BI, but have the potential to be a moderating variable (homologiser moderation). Furthermore, the variable moderating TA (ie business characteristics) only acts as a predictor in the relationship model that is formed.

Recommendations

Behavioral intention significantly influences the phase of IT adoption in MSMEs. Therefore, it is necessary to intervence in enhancing the factors influencing behavioral intention of MSME actors in order to increase the usage of IT in MSMEs.

For further research, in the development of the model, other individual characteristics that can be assessed have to be explored and included in the model of factors influencing IT adoption in MSMEs that are more appropriate for Indonesia's conditions.

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